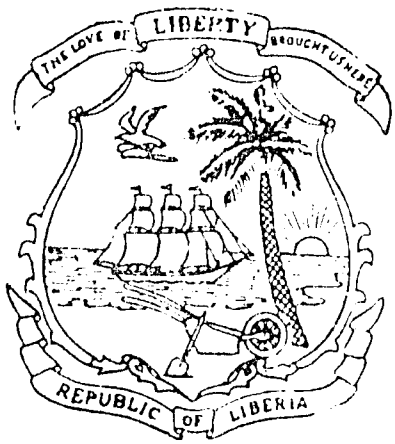
PD-AAY-688

Annual Report

U. S. BUREAU OF PUBLIC ROADS
LIBERIA DIVISION



ACTIVITIES AND PROGRESS of the HIGHWAY PROJECT

Under The

INTERNATIONAL COOPERATION ADMINISTRATION PROGRAM

Fiscal Year 1961

July 1, 1960 to June 30, 1961.

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I INTRODUCTION

1. The Bureau of Public Roads, Liberia Division, under the International Cooperation Administration program, is responsible for the training and advising of personnel employed by the Division of Highways, Department of Public Works and Utilities, Government of Liberia.

2. The highway program in Liberia continued to expand during the fiscal year of 1961, opening up new areas for resources and aiding in the development of agriculture, education and health programs.

3. Development of the Division of Highways organization and training of personnel for the expanding program was carried on during the year with special emphasis on the Maintenance Section.

4. At the end of Fiscal Year 1961, the total length of the Liberian Highway System was 2,082 miles. This included 1,383 miles, or 66 per cent, actually in use; 86 miles, or 4 per cent, under construction; and 833 miles, or 40 per cent, in the approved future long range program. Roads controlled by private or commercial interests and secondary roads which will inevitably be developed to connect with the primary system are not included. Of the total 2,082 miles, 1,383 miles are primary highways and 699 miles are secondary roads.

   The following tables shows the mileages in tabular form:

Status	Miles		
	Primary	Secondary	Totals
In Use	714	449	1,163
Under Construction	33	53	86
Future Approved Programs	636	197	833
Grand Total	1,383	699	2,082

II ADMINISTRATION

1. U.S. Bureau of Public Roads

   A. Arthur M. Sandridge was Division Engineer and Chief Highway Advisor in Liberia for the Highway Program

of the U.S. Operations Mission to Liberia. Bureau of Public Roads engineers and technicians who served in the highway organization during the fiscal year were:

Arthur M. Sandridge - Division Engineer
Albert G. Hillyard - Supervising Construction & Maintenance Engineer (to May)
Richard J. Williamson - Supervising Construction & Maintenance Engineer (from June)
Vernon V. Cusack - Office Engineer (from July)
Richard J. Davis - Location & Design Engineer
Clarence O. Scheid - Farm-to-Market Superintendent
Donald F. Roach - Materials Engineer
Harvey H. Dibbern - Shop Superintendent (to March)
Harold E. Mitchell - Shop Superintendent (to April)
George C. Kamps - Maintenance Superintendent (to Nov.)
Chester C. Steear - Maintenance Engineer (from Aug.)
Rufus E. Kojonen - Equipment Specialist
Warren G. Tadlock - Equipment Specialist
Earl C. Brinton - General Supply Officer (to July)

B. Arrivals

Mr. Vernon V. Cusack, Office Engineer, arrived in Monrovia, on July 6, 1960. He came here from Ketchikan, Alaska where he was Resident Engineer for the Bureau of Public Roads.

Mr. Chester C. Steear, Maintenance Engineer, arrived in Liberia on August 14, 1960. He was transferred from Juneau, Alaska where he had been General Foreman for the Juneau District.

Mr. Harold E. Mitchell, Shop Superintendent, arrived on April 12, 1961, from Denver, Colorado. Mr. Mitchell has previously been in Jordan and Iran with the Bureau of Public Roads.

Mr. Richard J. Williamson, Supervising Construction & Maintenance Engineer, arrived in Monrovia on June 14, 1961. He has been working in the Federal Projects Division in Washington, D.C. Mr. Williamson served in Liberia previously from 1952 to 1958.

C. Departures

Mr. Earl C. Brinton, General Supply Officer, departed on July 21, 1960 for home leave and subsequently resigned. Mr. George C. Kamps, Maintenance Superintendent, departed on November 15, 1960, for home leave and re-assignment. Mr. Harvey H. Dibbern, Shop Superintendent, departed March 21, 1961, for a domestic assignment. Mr. Albert G. Hillyard, Construction & Maintenance Engineer, departed May 29, 1961, for home leave and re-assignment.

D. Bureau of Public Roads - Roster

At the end of the fiscal year, the staff of this department, Liberia Division, was as follows:

Division Engineer
Construction & Maintenance Engineer
Farm-to-Market Road Superintendent (On Home Leave)
Office Engineer
Location & Design Engineer
Materials Engineer
Maintenance Engineer
Shop Superintendent
Equipment Specialist (Monrovia Shop)
Equipment Specialist (Wenzu Shop)

There were five approved positions not filled. They are as follows:

Bridge Engineer
Maintenance Superintendent(Monrovia)
Maintenance Superintendent (Wenzu)
Maintenance Superintendent (Tappita)
Equipment Specialist (Tappita Shop)

Candidates for three of the positions were being processed at the end of the fiscal year. It is anticipated that the other positions will be filled in the near future. This number of vacancies makesit difficult for the Division to carry out the Highway Program.

2. GOL Division of Highways

A. The Department of Public Works and Utilities' officials are as follows:

Secretary Joseph W. Boayue
Under Secretary D. Colston Nelson (Utilities)
Under Secretary M. Alexander Ketter (Works)
Under Secretary F. Williamson
Assistant Secretary Edith Harris
Assistant Secretary Samuel D. Nayreau

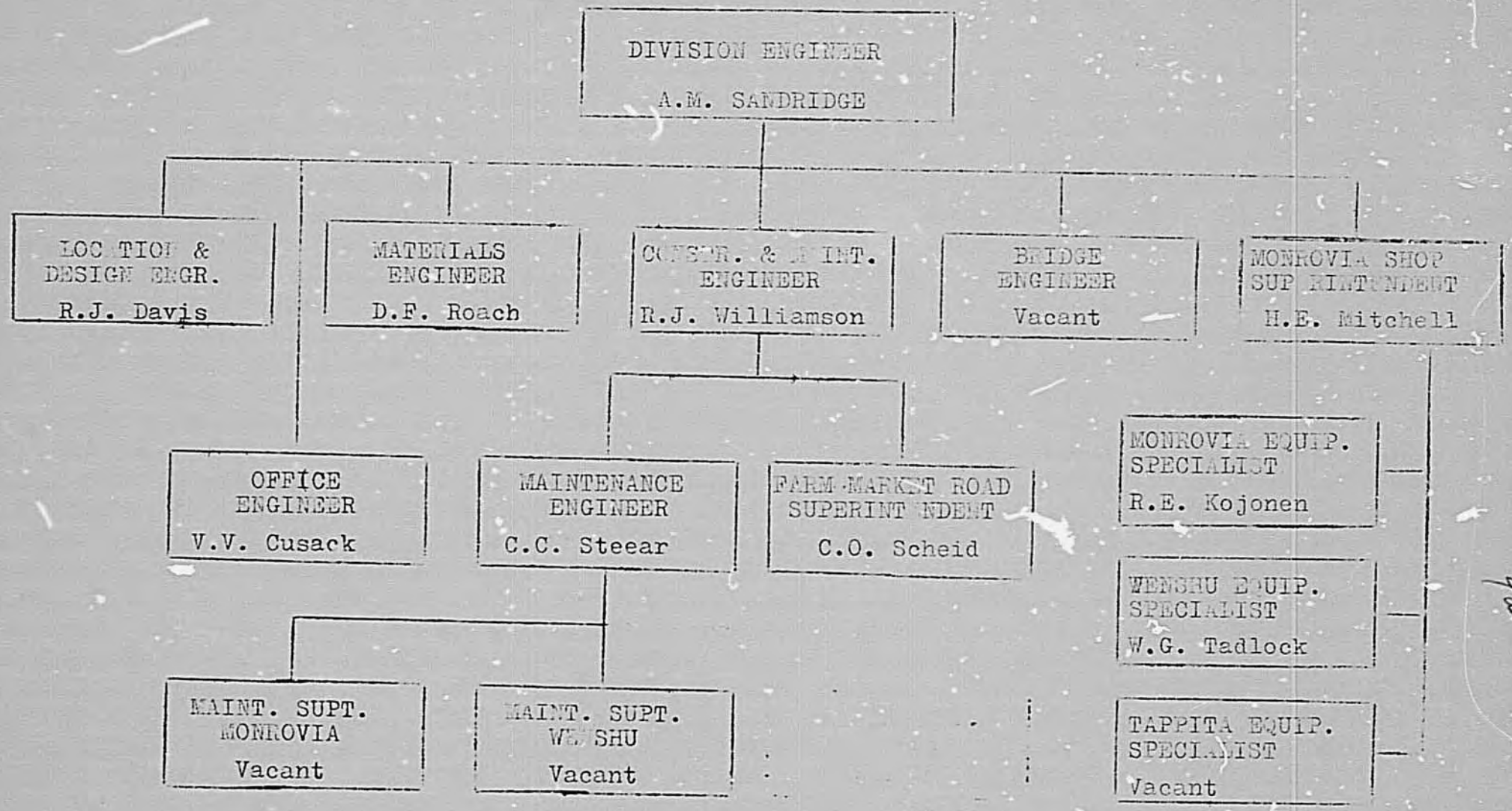
The Division of Highways:

Mr. S. D. Brownell, Chief, Division of Highways, was appointed this year.

B. At the end of the fiscal year the following administrative engineering positions were filled, either by Liberian or Third National personnel:

Chief, Division of Highways	- Liberian
Technical Office Manager	- Liberian
Maintenance Engineer	- Hatian
Design Engineer	- Liberian
Location Engineer	- Filipino
Materials Engineer	- Yugoslavian
Bridge Engineer	- German
Project Engineer, Central Province	- Filipino
Project Engineer, Central Province	- Liberian
Project Engineer, Central Province	- Liberian
Project Engineer, Eastern Province	- Haitian
Project Engineer, Saniquellie F-M	- Liberian
Project Engineer, Sinoe Farm-to-Market	-Liberian
Shop Superintendent, Monrovia	- Liberian
Assistant Shop Superintendent, Monrovia	-Liberian
Shop Warehouseman, Monrovia	- Liberian
Shop Superintendent, Wenzu	- Liberian
Shop Superintendent, Pleebo	- Liberian
Supply Officer	- Liberian

C. The engineering services for construction on the Vianini contracts in the Central and Eastern provinces are supplied by the GOL Division of Highways.



ORGANIZATION OF THE
U.S. BUREAU OF PUBLIC ROADS
LIBERIA DIVISION

June 30, 1961

III GENERAL COMMENTS

1. The Second Annual Highway Maintenance Seminar was held at the Department of Public Works and Utilities, Monrovia, Liberia, September 13, 14, 15, and 16. Great interest was shown by the highway personnel participating.

2. The first Highway Maintenance Manual for Liberia was completed and copies distributed to all Maintenance Engineers and Supervisors.

3. Mr. C. N. Aldrich, Chief, Foreign Projects Division, Bureau of Public Roads made an official visit from October 2, 1960 to October 7, 1960. During his stay he conferred with the Ambassador, Director of USOM/L, GOL Officials and BPR engineers. He made an inspection trip of highway construction and maintenance projects.

4. Equipment has been ordered for the construction of roads under the Rural Area Development Program. Construction is expected to begin at the start of the next dry season.

5. Construction was begun on the Monrovia Bypass. When completed, this will route heavy truck traffic from the Freeport around Monrovia and alleviate the traffic problem in Monrovia.

6. At the end of the Fiscal Year there were six Liberians in the participant training program in the United States. Three are studying Civil Engineering and three are receiving on-the-job training in asphalt maintenance, materials testing and automotive repairs. One other student is studying in the pre-engineering course at the University of Liberia.

7. During the year, five Liberians returned from training in the United States. Three were placed with the Division of Highways as Project Engineers, one was appointed Chief, Division of Highways and the fifth has been granted a scholarship for advanced study in Italy. All of these men were self-financed.

8. On-the-job training has been conducted continuously throughout the year. Each piece of heavy equipment has one trainee assigned to it. Training of instrument men, rodmen, chainmen, etc. is conducted by all party chiefs. Instruction in preventive maintenance and equipment repairs is carried on by BPR technicians.

IV LOCATION

1. Project P1-C, Salala to Totota, Central Province

Type of Project - Relocation Survey	
Length of Project	13.6 Mi.
Survey by Division of Highways	
Survey started - February 1, 1959	
Progress in Fiscal Year 1961	6.4
Progress to June 30, 1961	13.6
Per Cent Complete	100%

2. Project P4-C, Tubman Bridge to Kle

Type of Project - Relocation Survey	
Length of Project	32.0 Mi.
Survey by Division of Highways	
Survey Started July, 1960	
Progress in Fiscal Year 1961	19.0
Progress to June 30, 1961	19.0
Per Cent Complete	59%

3. Project P1-D, Totota to Suakoko

Type of Project - Relocation Survey	
Length of Project	31.0 Mi.
Survey by Division of Highways	
Survey Started October, 1960	
Progress in Fiscal Year 1961	12.3
Progress in June 30, 1961	12.3
Per Cent Complete	40%

4. Monrovia Bypass

Type of Project - Primary Highway Location	
Length of Project	8.1 Mi.
Survey by Division of Highways	
Survey Started February, 1961	
Progress in Fiscal Year 1961	2.6
Per Cent Complete	32%

5. Juarzon-Cbiboh

Type of Project - Secondary Highway Location	
Length of Project	50.0 Mi. Approx.
Survey by Division of Highways	
Survey Started May, 1961	
Progress in Fiscal Year 1961	6.8
Per Cent Complete	13.6%

6. Farmington River Bridge Approaches

Type of Project - Primary Highway Location	
Length of Project	0.87 Mi.
Survey by Division of Highways	
Progress in Fiscal Year 1961	0.87
Per Cent Complete	100%

7. Sheffelien Road

Type of Project - Secondary Highway Location	
Length of Project	12.0 Mi.
Survey by Division of Highways	
Progress in Fiscal Year 1961	12.0
Per Cent Complete	100%

8. Road to Police Academy

Type of Project - Access Road	
Length of Project	0.4 Mi.
Survey by Division of Highways	
Progress in Fiscal Year 1961	0.4
Per Cent Complete	100%

V DESIGN

1. Project P1-A, B, C, Firestone Gate 15 to Totota, Central Province

Type of Project - Engineering design of existing laterite surfaced highway prior to base stabilization and asphalt surfacing.

Length of Project	54 Mi.
Design Started July, 1958	
Progress for Fiscal Year 1961	26
Progress to June 30, 1961	54
Per Cent Complete	100%

2. Project P1-D, Totota to Suakoko

Type of Project - Engineering design of existing laterite surfaced highway prior to base stabilization and asphalt surfacing.

Length of Project	31.0 Mi.
Design Started December, 1960	
Progress for Fiscal Year 1961	6.0
Progress to June 30, 1961	8.9
Per Cent Complete	29%

3. Project P4-A & B, Kle-Pujehun, Western Province

Type of Project - Engineering design of proposed primary highway prior to construction.

Length of Project	44 Mi.
Design by Division of Highways	
Design Started November, 1958	
Progress for Fiscal Year 1961	10.4
Progress to June 30, 1961	44
Per Cent Complete - Revisions are being made.	

4. Project P4-C, Tubman Bridge to Kle

Type of Project - Engineering design of existing lat-rite surfaced road prior to improvement.

Length of Project	32 Mi.
Design by Division of Highways	
Design Started August, 1960	
Progress for Fiscal Year 1961	17.05
Progress to June 30, 1961	17.05
Per Cent Complete	53%

5. Project S-4, Tchein to Konobo, Eastern Province

Type of Project - Grading, drainage, structures and surfacing.

Length of Project	32 Mi.
Design by Division of Highways	
Design Started January, 1960	
Progress for Fiscal Year 1961	5.7
Progress to June 30, 1961	24.2
Per Cent Complete	76%

6. Sheffelein Road (Road to Military Acidemy)

Type of Project - Grading, drainage and surfacing

Length of Project	12 Mi.
Design by Division of Highways	
Design started November, 1960	
Progress for Fiscal Year 1961	12
Progress to June 30, 1961	12
Per Cent Complete	100%

7. Farmington River Bridge Approaches

Type of Project - Grading and surfacing	
Length of Project	0.87 Mi.
Design by Division of Highways	
Progress for Fiscal Year 1961	0.87
Per Cent Complete	100%

8. Road to Police Academy

Type of Project - Grading, drainage and asphalt surfacing.

Length of Project	0.4 Mi.
Design by Division of Highways	
Progress for Fiscal Year 1961	0.4
Per Cent Complete	100%

9. Monrovia Bypass

Type of Project - Engineering design of proposed superhighway prior to construction.

Length of Project	8.1 Mi.
Design by Division of Highways	
Progress for Fiscal Year 1961	2.8
Per Cent Complete	31%

VI CONSTRUCTION

1. Highways

A. Project P-1, A, B, C, & D, Firestone Gate 15 to Suakoko, Central Province

Type of Project - Construction of grading, drainage, base course and bituminous pavement.

Length of Pavement	85 Mi.
Contractor - Vianini (Liberia) Ltd.	
Field Engineering by Division of Highways	
Construction Started December, 1958	
Progress for Fiscal Year 1961 -	
Grading & Reshaping	25.0
Stabilized Base Course	1.5
Tack Coat	43.4
Bituminous Pavement	12.0

Milage and Per Cent Completed as of June 30, 1961-

Grading & Reshaping	59 Mi.	- 70%
Stabilized Base Course	1.5	- 100
Tack Coat	54.8	- 64
Bituminous Pavement	34.5	- 40

NOTE: Paving was resumed in November, 1960 and suspended in May, 1961 at the beginning of the rainy season.

B. Project P3-C through J, Tappita to Karloke, Eastern Province

Type of Project - Construction of grading, drainage, structures and laterite surfacing.

Length of Project 189 Mi.
Contractor - Vianini (Liberia) Ltd.
Field Engineering by Division of Highways
Construction Started February, 1958
Progress for Fiscal Year 1961 -

Clearing	30
Rough Grading	30
Fine Grading	37
Laterite Surfacing	36

Milage and Per Cent Completed as of June 30, 1961 -

Clearing	105	- 56%
Rough Grading	97	- 51
Fine Grading	94	- 50
Laterite Surface	72	- 38

C. Project S-2, Greenville to Juarzon, Farm-to-Market Road

Type of Project - Construction of grading, drainage, structures and laterite sufracing.

Length of Project 42 Mi.
Construction by Division of Highways Forces
Cons truction Started April, 1958
Progress for Fiscal Year 1961 22
Progress as of June 30, 1961 42
Per Cent Complete 100%

D. Project S-5, Saniquellie to Bahn, Central Province

Type of Project - Grading, drainage and laterite surfacing.

Length of Project 60 Mi. Approx.
Construction Started September, 1959
Progress for Fiscal Year 1961 -

Clearing	5
Rough Grading	10
Fine Grading	8
Laterite Surface	6

Milage and Per Cent Complete as of June 30, 1961 -

Clearing	17 Mi.	- 28%
Rough Grading	17	- 28
Fine Grading	15	- 25
Laterite Surface	13	- 22

E. Sheffelien Road (Road to Military Academy)

Type of Construction - Grading, drainage and laterite surfacing.

Length of Project 12 Mi.
Constractor - Vianini (Liberia) Ltd.
Progress for Fiscal Year 1961 12
Per Cent Complete 100%

F. Road to Police Academy

Type of Construction - Grading, drainage and asphalt surfacing.

Length of Project 0.4 Mi.
Contractor - Vianini (Liberia) Ltd.
Progress for Fiscal Year 1961 0.4
Per Cent Completed 100 %

G. Monrovia Bypass

Type of Project - Grading, drainage and asphalt surfacing.

Length of Project 8.1 Mi.
Contractor - Vianini (Liberia) Ltd.
Progress for Fiscal Year 1961 -

Clearing	2	- 25%
Stripping	2	- 25

2. Bridges

A. Project P1-B, Nayonovolah River

Three 50' concrete T-beam spans, 100% complete.

B. Project P3-G

1) Sta. 188, two 50' concrete T-beam spans, 100% complete

2) Sta. 410, three 60' concrete T-beam spans, one 120' concrete box girder, 75% complete.

3) Sta. 772, one 50' concrete T-beam span, 100% complete.

C. Project P3-H

1) Guny River, two 50' concrete T-beam spans, 100% complete.

2) Sewn River, two 60' concrete T-beam spans, 100% complete.

3) Sta. 1209, two 60' concrete T-beam spans, 100% complete.

4) Sta. 2345, one 50' concrete T-beam span, 100% complete.

D. Project P4-B, Lofa River, four 100' and three 120' concrete box girder spans, 50% complete.

E. Project P4-C, Kpo River, two 80' and one 120' concrete box girder spans, 50% complete.

F. Project P4-F, Farmington River Bridge, five 120' concrete box girder spans, 100% complete.

G. Project P6-A, Maher River Bridge, two 80' and one 120' concrete box girder span, 75% complete.

H. Project P1-A, B & C, Gate 15 to Totota, several bridge widening projects in various stages of completion.

VII HIGHWAY MAINTENANCE

1. Additional road milage and increased traffic has made it necessary to reorganize the maintenance into four field divisions.

   A. Division I will include the following road systems: Sheffelien, Bomi Hills, Brewerville, Bopolu, Roysville, Virginia, Clay-Ashton, Arthington and all feeder roads in this area that are presently on the system. Headquarters will be Brewerville.

   B. Division III will maintain all roads on the system from Totota to Gbarnga, and from Gbarnga through Zorzor, Voinjama and Konjo. Zorzor will be Division headquarters.

   C. Division II consists of the White Plaines, Dobli Island, Todee, and the Kakata Road Systems. The present headquarters at Kakata will be utilized.

   D. Division IV comprises all of the old Division III without additional roads. Headquarters will remain at Ganta.

2. Stick culverts and small wooden bridges, when showing structural failure, are being replaced with concrete or corrugated metal pipe.

3. During the month of September, a Highway Maintenance Seminar was held, covering a four-day period. The completed Maintenance Manual, prepared by BPR technicians was distributed to all attending Liberian personnel.

4. A foreman in the asphalt maintenance section departed for training as a participant in the ICA-sponsored United States training program.

VIII MATERIALS

1. Testing and controls of highway and public works material increased approximately 10% over last fiscal year. However, a shortage of trained personnel prevents maximum utilization of the laboratory.

2. The first Liberian National from the Material's Section was sent to the United States for training in materials testing.

3. Limited research was conducted on stabilization of lateritic soils with portland cement and bitumens.

4. Technical advice and testing facilities were furnished for the Voice of America project, Robert's Field extension, and to contractors and engineers in Liberia.

5. The Section performed the following tests during the year:

   Tested 346 concrete cylinders and blocks
   Analyzed 44 soil samples
   Analyzed 55 aggregate samples
   Tested 72 soil cement blocks
   Prepared 25 gallons of battery acid
   Distilled 127 gallons of water

   Tested asphalt and portland cement samples.

6. Soils profiles were made on Project P4-B and the Monrovia Bypass.

7. Laterite pits for selected borrow were located on the Monrovia Bypass, Project P2-B & C, Project P4-B, Sheffelien Road, Project P3-G, and Project P3-A and B.

8. Concrete compression tests were made for the New Executive Mansion, Treasury Building, Law Courts Building and Liberian Information Service Building.

IX SHOP

1. The main shop of the Department of Public Works and Utilities in Monrovia completed 1,548 work orders on light equipment and 168 work orders on heavy equipment during the year. A considerable amount of equipment downtime was accrued due to a shortage of parts.

2. One Liberian shop employee was sent to the United States for training in automotive repairs. All of the shop personnel attended the Highway Maintenance Conference which was held in Monrovia in September.

3. B.P.R. shop personnel increased their trips to the field to inspect facilities and repair equipment. Special emphasis was placed on preventive maintenance.

X EQUIPMENT

At the end of the fiscal year, the following equipment was assigned to the highway program:

Maintenance

Division I - 3 Caterpillar Motor Graders
3 Dump Trucks
1 Tractor Loader
1 Pickup

Division II - 2 Caterpillar Motor Graders
2 Dump Trucks
1 Pickup

Division III - 3 Caterpillar Motor Graders
1 Tractor Loader
2 Dump Trucks
1 Pickup

Division IV - 3 Caterpillar Motor Graders
4 Dump Trucks
1 Tractor Loader
1 Pickup

Asphalt Division - 1 Patchmobile
2 Dump Trucks
1 Steel Wheeled Roller

Monrovia, Shop, Pool Equipment -

1 Caterpillar Motor Grader
2 Tournapulls
1 Tournarocker
2 D-7 Tractors w/blades
1 Lowboy Trailer
1 Chevrolet Tractor Truck
1 Ford F-800 7-ton truck

Farm Market Roads -2 D-7 Tractors w/blades
2 Caterpillar Motor Graders
2 Caterpillar Scrapers
1 Oliver Tractor Loader
1 Dump Truck
1 Pickup

XI WEATHER (Monrovia) FY '61

	Temperature		Rainfall	
	High	Low	FY 1961	9 Yr. Ave.
July , 1960	86	69	19.20"	30.57"
August	88	67	23.41	17.76
September	86	70	38.27	24.69
October	87	71	19.48	24.69
November	89	72	3.92	10.49
December	89	66	6.84	4.86
January, 1961	90	58	1.02	2.19
February	90	65	1.90	2.35
March	91	66	4.95	3.93
April	91	68	8.28	6.97
May	92	67	17.58	18.42
June	90	68	42.46	39.35
Total			187.31"	186.27"

LIBERIAN HIGHWAY SYSTEM

PRIMARY HIGHWAYS

ROUTE No	TERMINI		
P1	GATE 15 (FIRESTONE)	—	SANOKOLE (SANOKWELLE)
P2	JUNCTION ROUTE P1 (NEAR GBANKA)	—	KONJO
P3	HARPER	—	GAMPA (GANTA)
P4	PUJEHUN	—	JUNCTION ROUTE P3 (NEAR TAPPITA)
P5	BREWERVILLE	—	ZORZOR
P6	KLE (KLAY)	—	JUNCTION ROUTE P2 (NEAR KOLAHUN)
P7	BUCHANAN	—	IVORY COAST BORDER (E OF TAPETA)

SECONDARY HIGHWAYS

ROUTE No	TERMINI	
S 1	KARLONE (NEAR HOWEKE)	— NYAAKE (WEBO)
S 2	GREENVILLE	— JUARZON
S 3	BENDAJA	— SAWILO

AIR STRIPS
AIR FIELDS } AIR STRIPS NOT DRAWN TO SCALE
10 AIRFIELDS
28 AIRSTRIPS
HARBOURS

MAP OF LIBERIA
Development of Highways

APPROXIMATE SCALE 1:1,000,000

MILES

KILOMETERS

LEGEND

HARD SURFACED (BITUMINOUS)
LOOSE SURFACED (LATERITE)
GRADED OR UNIMPROVED
UNDER CONSTRUCTION
UNDER SURVEY OR DESIGN
UNIMPROVEDED ROUTES
RAILWAY TRACK
RAILWAY TRACK UNDER CONSTRUCTION

BASE MAP BY LIBERIAN CARTOGRAPHIC SERVICE

16

SAGLEIFIE AREA - SURFACE MAINTENANCE

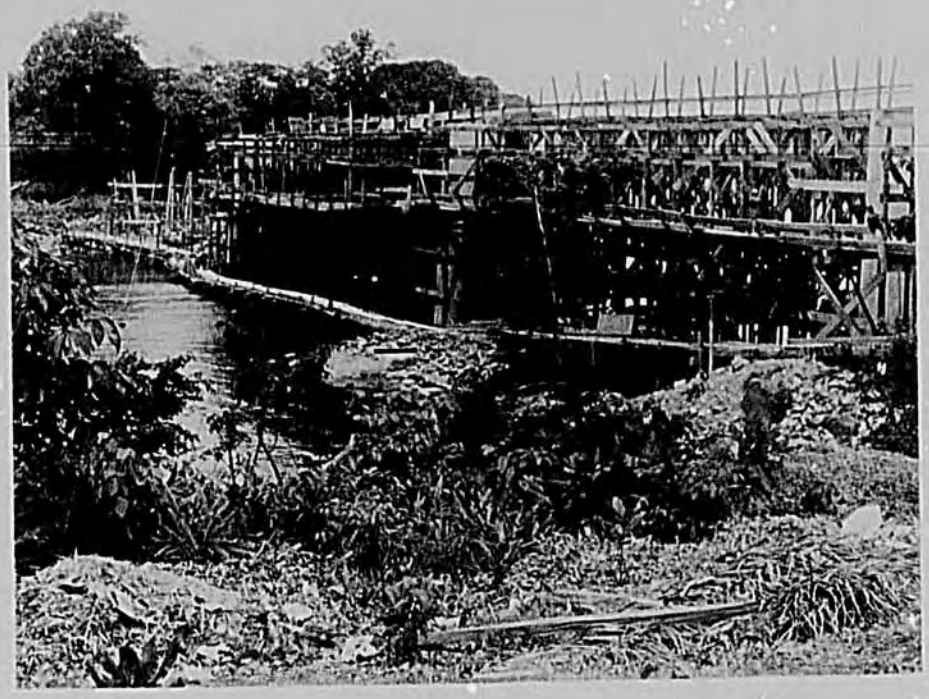
BOPOLU ROAD - MAINTENANCE

Pl-B, KONALA - PLANT MIX PAVING

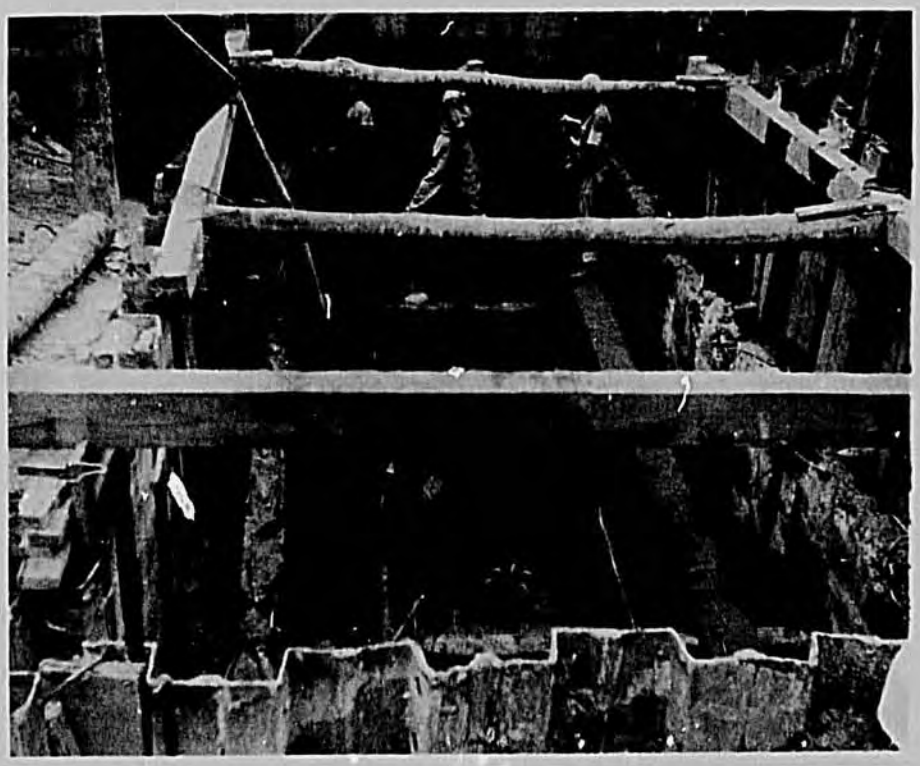
Pl-C, BASE STABILIZATION WITH BUNKER "C" OIL

FARMINGTON RIVER BRIDGE - COMPLETED

P3-G TCHIEN - COMPLETED BRIDGE



LOFA RIVER - FALSEWORK FOR TWO SPANS



KPO RIVER - FOOTING, PIER NO. 1

P1-C, NEAR TOTOTA - PLACING EMBANKMENT

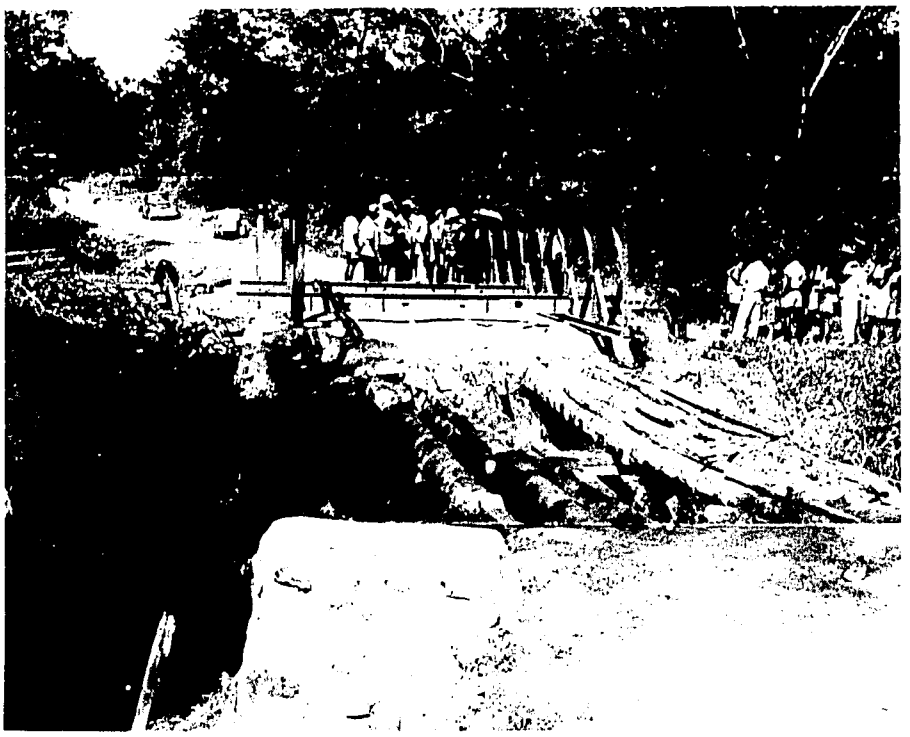
P1-C, SALALA - SURFACE TREATMENT WITH EMULSION

P3-G, TCHIEN - GRADING OPERATION

P3-G, TCHIEN - ROUGH GRADING

MAINTENANCE SEMINAR PARTICIPANTS

NEAR GANTA - PROPER ROADSIDE BRUSH CONTROL



SANIQUELLIE F-M PROJECT - REPLACING OLD BRIDGE WITH BAILEY BRIDGE, NEAR SIKIMPA

SANIQUELLIE F-M PROJECT

SINOE COUNTY F-M PROJECT - DITCHING AND SHAPING

SINOE COUNTY F-M PROJECT - COMPLETED SECTION